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California Department of Water Resources
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Subject: Draft GSP Regulations Public Comment

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Overall Comments

We would like to commend DWR for writing such a comprehensive, clear draft of the GSP regulations; and we are delighted to have the opportunity to comment. We know that the document is the culmination of tremendous effort by the Department as well as many other scientists, stakeholders and managers throughout the state. Some general comments are stated below, followed by a list of specific comments.

An overarching comment pertains to the 20-yr timeframe for achieving sustainability goals. We are concerned that in groundwater systems already being rapidly overdrafted, and especially in cases where the overdraft was ongoing long before the current drought, the 20-yr timeframe may be too long to effect corrective action that is sufficient to prevent much more negative, potentially irreversible, undesirable effects. Moreover, if drought conditions continue or ongoing climate change effects also start to significantly affect surface water inflows and water demand, accelerated timetables may be necessary. In such cases, the State should have the authority to effect faster action.

Other, broadly applicable comments concern the collection of subsurface geologic data, water level gradient data, the definition and relevance of "interconnected" surface water, development of historical system behavior characterizations for different hydrologic episodes, and the consequences of subsidence. Details on these and other comments and edits can be found below.

Chapter 1.5, Subchapter 2, Article 1

§ 350.2 (a) *"The Plan must achieve the sustainability goal for the entire basin within 20 years of Plan implementation without adversely affecting the ability of an adjacent basin to implement their Plan or achieve their sustainability goal."*

We are concerned that in groundwater systems already being rapidly overdrafted, and especially in cases where the overdraft was ongoing long before the current drought, the 20-yr timeframe may be too long to effect corrective action that is sufficient to prevent much more negative, potentially irreversible, undesirable effects. Moreover, if drought conditions continue or ongoing climate change effects also start to significantly affect surface water inflows and water demand, accelerated timetables may be necessary. In such cases, the State should have the authority to effect faster action.

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§ 351. (e) *"Baseline or "baseline conditions" refer to historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin."*

The regulations should make it clear that climate change can render obsolete baseline estimates that are derived from historical data that is no longer representative of the future. While such changes may be gradual (e.g., multi-decadal time scales), the loss of snowpack and change in runoff timing due to warming are also sufficiently predictable for them to be factored into an ongoing reevaluation of the baseline conditions within the adaptive management framework. Importantly, as projections of climate and consequent upland watershed hydrologic responses improve, the feasibility of adjusting baselines *a priori* will improve.

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§ 351. (j) *"Critical parameter refers to chronic lowering of groundwater levels indicating a depletion of supply if continued over the planning and implementation horizon, reduction of groundwater storage, seawater intrusion, degraded water quality, land subsidence that substantially interferes with surface land uses, and depletions of surface water that have adverse impacts on beneficial uses of surface water that may lead to undesirable results, as described in Water Code Section 10721(x)."*

The qualifier: “land subsidence that substantially interferes with surface land uses” oversimplifies and underestimates the detrimental effects of subsidence. While we agree that the largest or most obvious damages caused by subsidence are likely to be the disruptions in surface land uses, including roads, canals and drainage, pipelines, buildings and railroad track alignment, there are other, less obvious subsurface effects of subsidence that should not be minimized. For example, it is well known that the recharge of semi-confined aquifers, which comprise most of the alluvial aquifer systems in California, occurs via downward leakage across fine-grained confining beds. The compaction of these confining beds due to subsidence does in fact reduce the hydraulic conductivity of the beds, thereby reducing rates of recharge to underlying aquifers.

Similarly, it can be argued that compaction of these fine-grained beds, which comprise most of the sediments in typical alluvial aquifer systems of California, can also reduce the effective confined, elastic storage coefficient of the aquifer system, impairing the natural storage functions of the system and increasing water level drawdowns in wells. Furthermore, the subsidence causes permanent loss in water storage capability of a volumetric quantity that equals the volumetric drop in land surface. While this volume may be small compared to the total volume of water in storage in thick aquifer systems like those in the Central Valley, such losses can be much more significant, as a percentage of total storage volume, in thinner aquifer systems. Moreover, it is incorrect to assume that this loss of water in storage would have only occurred through inelastic compaction and that it is therefore not a significant storage loss.

Additionally, subsidence can collapse well casings, destroying the wells while also confounding efforts to properly plug and decommission the wells. Therefore, it should not only be “subsidence that substantially interferes with surface land uses” that is considered to be an undesirable effect. The subsurface effects can also be considerable.

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§ 351. (z) (ab) “*“Seasonal high” refers to the highest annual static groundwater elevation that is typically measured in the Spring and associated with stable aquifer conditions following a period of lowest annual groundwater demand.”*

"Static groundwater elevation" needs to be defined somewhere, and the definition should include the stipulation that the water level is measured while the well is not pumping and has not been pumping for a specified period of time (probably at least an hour or so).

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§ 352.6. (b) (2) *"Wells used as the source of basic geologic or other information, including data used to develop the hydrogeologic conceptual model, to determine the water budget, or establish the basin setting, shall provide the best available information. All available information about the wells shall be reported in the Plan, which shall include, at a minimum, well location, well construction, and well use."*

Consider replacing "well construction," with "well construction (including screened intervals)".

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§ 352.6. (b) (3) *"Wells used to monitor groundwater conditions shall be constructed according to standards described in DWR Bulletin 74-90, as amended, and shall include the following identifying information presented in both tabular and geodatabase-compatible shapefile form"*

One of the most useful, essential pieces of information that comes from constructing a well is the descriptive log of the sediments and rocks encountered by the drill bit during drilling, yet no mention is made of this descriptive log. It should be stipulated that all sediments and rocks encountered by the drill bit will be described in accordance with best hydrogeologic practices. Furthermore, if any cores are collected, descriptions of those (sediment textures, fracturing, etc.) should also be included.

Furthermore, we believe that in some basins, the stipulation that all monitoring wells shall be constructed according to the standards will eliminate many useful monitoring wells. People should be allowed to use monitoring data from any and all wells, but if some of those do not meet the standards, they should just be required to categorize the data into higher quality and lower quality tiers. We would rather have lots of marginal quality data than just a small amount of high quality data. Use all available data, but if some of it is marginal in quality, require categorization of the data quality.

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§ 352.6. (b) (3) (F) *"Any geophysical logs, well construction diagrams, or other relevant information, if available.*

This sentence should be modified to include the driller's descriptive log of the subsurface material types penetrated by the drill bit (i.e., the drillers descriptive log of the drill cuttings and any cores that were collected).

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§ 352.8. *"Each Agency shall develop and implement a coordinated data management system that is capable of storing, maintaining, and reporting all relevant information related to the development or implementation of the Plan."*

Does not address the problem of sharing of data across GSA boundaries or with DWR, which will need to be part of the data management system and plan.

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§ 353.6 *"Upon request, prior to adoption of a Plan, the Department shall provide reasonable assistance to an Agency regarding the elements of a Plan required by the Act and this Subchapter. Notwithstanding any advice provided by the Department, the Agency is solely responsible for the development and adoption of a plan that is capable of achieving sustainable groundwater management."*

More explicit details should be given for "reasonable assistance" agencies can expect to receive (i.e. fees, time frame, type of technical advising available).

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§ 354.8. (g) (2) *"A description of how implementation of existing land use plans are expected to change water demands within the basin."*

More details would be helpful here. For example, what level of quantitative specificity is desired and over what time scales?

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§ 354.8. (g) (8) *"How implementation of existing land use plans outside the basin, including a description of how implementation of those land use plans could affect the ability of the Agency to achieve sustainable groundwater management, for any area the Agency determines to be linked to the hydrology of the basin governed by the Plan."*

Specific SOPs should be developed to coordinate plans between linked basins.

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§ 354.14. (4) (B) *"The physical properties of aquifers and aquitards, including their lateral and vertical extent, hydraulic conductivity, and storativity, which information may be based on existing technical studies or other sources of information."*

Since many of the so-called aquifers contain abundant silt and clay beds, in addition to the mentioned parameters, it will be beneficial to map or describe the coarse/fine fractions. For example, much of what people consider to be 'aquifers' in the alluvial basins are comprised of mostly silt- and clay-rich sediments. Accordingly, maps of percent sand/gravel thickness maps can be very useful and diagnostic of both the effective transmissivity and the vertical connectivity or effective vertical hydraulic conductivity. Because of such conditions, many of the 'aquifers' have vertical hydraulic conductivities that are orders of magnitude lower than the horizontal hydraulic conductivities, although many existing models neglect this important characteristic. Such information and analysis also requires fundamental data obtained from drillers descriptive logs, cores and geophysical logs, which as pointed out above under § 352.6. (b) (3), is not sufficiently emphasized.

Although the data to construct percent sand/gravel maps may not exist in many cases, such characterizations should be strongly encouraged.

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§ 354.14. (c) *"Physical characteristics of the basin shall be represented on one or more maps that depict the following:"*

This section seems to be missing information on stream flows as well as stream diversions and returns. Measurements of stream flows as well as stream diversions and returns are essential for myriad reasons, including construction of water budgets and prudent stewardship of water resources.

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§ 354.14. (c) (4) *"Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including active springs, seeps, and wetlands within or adjacent to the basin."*

Suggest a revision such as: "Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and potential discharge areas, including active and inactive springs, seeps, and wetlands within or adjacent to the basin." Knowing the locations and conditions of formerly active springs, seeps and wetlands is important for identifying potential discharge areas that may become active again if and when groundwater storage increases to certain levels.

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§ 354.16. *"The Plan shall characterize current and historical groundwater conditions in the basin. The Plan shall rely on the best available data to characterize historical conditions prior to January 1, 2015. The description of historical basin conditions shall specifically include conditions that existed as of January 1, 2015, and a comparison with present conditions. The description shall also contain all of the following:"*

There should be some kind of guidance here on how far back in time the historical characterization should go. Without being overly prescriptive, perhaps this can be accomplished by stating the benefits of going far enough back in time to encompass any periods of (1) groundwater system/level stability (indicating what conditions are consistent with lack of overdraft), (2) groundwater system/level decline (indicating what conditions have created overdraft), and (3) groundwater system/level recovery (indicating what corrective action may work, and over what time frames). If the GSA can both characterize such episodes in the groundwater system history and estimate water budgets for the episodes, development of a rational GSP will be easier, more transparent, and more defensible.

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§ 354.16. (d) (1) *"The location of known groundwater contamination sites and plumes including current or historical waste discharge requirements, known historical or ongoing cleanup activities, and superfund sites."*

The implied context here is entirely point sources and does not explicitly include non-point. Language needs to be broadened to include non-point source contamination.

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§ 354.16. (f) *"Identification of interconnected surface water systems and groundwater-dependent ecosystems within the basin."*

Where these interconnections are identified, it would make sense to also quantify them to the best extent possible.

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§ 354.18. (a) *"The water budget shall quantify the following: (4) All water demands by water source type and water use sector."*

Would be helpful to clarify if "water use sector" also includes environmental flows. It is not included under the "§ 351. Definitions (ah)" for "water use sector."

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§ 354.18. (b)(2)(A) *"A quantitative evaluation of the historical surface water supply reliability as a function of the historical planned versus actual annual surface water deliveries, by water year type, and based on the most recent ten years of surface water supply information"*

Suggest re-writing this section to improve understandability.

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§ 354.18. (b)(2)(B) *"A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to adequately calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon."*

See comment above under § 354.16 regarding historical data.

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§ 354.18. (b)(3)(A) *"Projected hydrology shall utilize 50-years of historical precipitation, evapotranspiration, and streamflow information as the baseline hydrology over the planning and implementation horizon, while evaluating scenarios of future hydrologic uncertainty associated with projections of climate change and sea level rise"*

How future hydrologic scenarios are constructed needs to be clarified. It would also be helpful to clarify how far into the future climate change projections need to go. This is critical to evaluating the long-term economic benefits of capital intensive water projects.

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§ 354.22. *"This Subarticle describes criteria for sustainable management of a basin, including the standards by which an Agency shall define undesirable results and minimum thresholds for each relevant critical parameter…"*

Perhaps it is too open to have each GSA define "undesirable results and minimum thresholds for each relevant critical parameter." Perhaps the State should define these baseline "minimum thresholds" but then leave it open for each GSA to create more stringent requirements. This would be not unlike how the EPA regulates drinking water standards.

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§ 354.28. *"Minimum Thresholds (b)(2) Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be taken out of storage without causing undesirable results..."*

What if a groundwater basin's storage has already been critically compromised? Is it entirely up to a GSA if that previous storage level becomes a future target?

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§ 354.28 (b)(4). *"Degraded Water Quality. The minimum threshold for degraded water quality shall be the significant and unreasonable degradation of water quality, including the migration of contaminant plumes that impair water supplies, based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin."*

Insert after "plumes" "and shallow groundwater that has been degraded from non-point source contamination..."

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§ 354.34 (h)(1). *“Groundwater Elevations. The monitoring network shall be capable of demonstrating groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features that includes the following:”*

Should specify that these gradients should also include vertical gradients.

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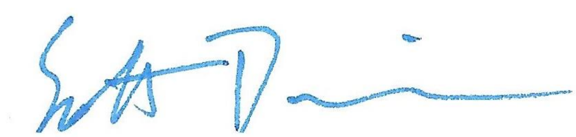
§ 354.34 (h)(6). *“Interconnected surface waters.”*

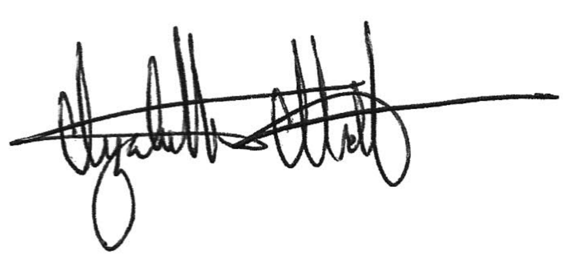
The term interconnected, as defined earlier, is too restrictive. It is defined earlier in the document as surface water that forms a saturated 'connection' with the water table. However, even streams that have no such saturated connection can contribute much to groundwater and should be measured. So-called ‘disconnected’ streams, connoting lack of saturated connection to the water table, are responsible for much of the recharge in CA groundwater basins.

Sincerely,

Alyssa DeVincentis



Scott Devine,



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